



NOV 2 2011

U.S. Department of Energy
Waste Treatment & Immobilization Plant
Mr. D. E. Knutson
Federal Project Director
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

CCN: 237683

Dear Mr. Knutson:

**CONTRACT NO. DE-AC27-01RV14136 – RESPONSE TO DOE-WTP SURVEILLANCE
REPORT S-11-WED-RPPWTP-042, REVIEW OF PRETREATMENT FACILITY
VESSEL VENT PROCESS SYSTEM HEADER PIPE INSTALLATION IN PLANNING
AREA 7**

- References:
- 1) CCN 240007, Letter, from D. L. Noyes, DOE-WTP, to R. W. Bradford, BNI, "The U.S. Department of Energy, Waste Treatment and Immobilization Plant (DOE-WTP) Surveillance Report S-11-WED-RPPWTP-042, Review of Pretreatment Facility (PTF) Vessel Vent Process (PVP) System Header Pipe Installation in Planning Area 7," 11-WTP-346, dated October 3, 2011.
 - 2) CCN 226536, Meeting Minutes, from R. Henckel, BNI, October 26, 2011, "Safety System Reconciliation List Review Meeting (SSR)," dated October 27, 2011.

The Reference 1 correspondence transmitted to BNI the results of the DOE-WTP surveillance of the Pretreatment Facility (PT) Vessel Vent Process (PVV) system header piping installation in Planning Area 7. One Finding and three Observations were identified and required a written response.

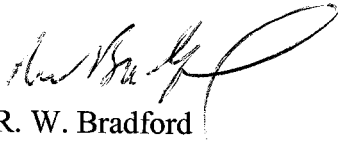
As a compensatory action in advance of work process changes to address alignment gaps between the safety basis and issued design that affects received equipment, equipment in procurement or completed/in progress installation, a review was completed by a joint team of BNI/DOE staff of each of the items on the Safety System Reconciliation (SSR) list (Reference 2). Following this joint review, BNI issued a Management Suspension of Work (MSOW) to control work associated with the ten items that remain on the SSR list (Page 4 of Attachment 1). As detailed in the Finding response and as discussed with DOE-WTP staff, work process changes will make the SSR list a living document such that the current list is expected to change as new issues arise.

Attachments 1 through 4 provide the responses for Finding F01 and Observations O01, O02, and O03. Attachment 5 provides a Work Process Flow Chart and illustrates the work process that will result from the commitments made in Finding F01.

As this new approach for managing items on the SSR list is implemented, there is a potential impact related to the increased utilization of the Justification for Continued Design, Procure, and Installation process and delays related to turnaround time.

Please contact Joni Weamer (371-3543) if there are questions related to this response.

Very truly yours,

A handwritten signature in black ink, appearing to read 'R. W. Bradford', with a large, stylized flourish at the end.

R. W. Bradford
Deputy Project Director/Project Manager

DJP/yld

- Attachments:
- 1) Response to Finding S-11-WED-RPPWTP-042-F01
 - 2) Response to Observation S-11-WED-RPPWTP-042-O01
 - 3) Response to Observation S-11-WED-RPPWTP-042-O02
 - 4) Response to Observation S-11-WED-RPPWTP-042-O03
 - 5) Work Process Flow Chart

cc:

Beranek, F. w/a	WTP	MS17-A
Bradford, R. W. w/o	WTP	MS14-3C
Brown, R. E. w/o	WTP	MS12-2B
Charboneau, S. L. w/o	ORP	H6-60
Crawford, S. S. w/a	WTP	MS14-2B
Dawson, R. L. w/o	DOE-WTP	H6-60
Dunkirk, J. H. w/o	WTP	MS14-3B
Ehlinger, M. A. w/a	WTP	MS5-K
Futrell, G. F. w/o	WTP	MS14-2A
Hajner, R. S. w/o	WTP	MS14-1B
Kacich, R. M. w/o	WTP	MS14-3B
Oxenford, W. S. w/o	WTP	MS4-A2
Patterson, T. M. w/a	WTP	MS16-B
Pisarcik, D. J. w/a	WTP	MS16-B
Russo, F. M. w/o	WTP	MS14-3C
Samuelson, S. L. w/o	ORP	H6-60
Sawyer, S. L. w/o	WTP	MS14-3C
Scarpino, J. A. w/o	WTP	MS14-3B
Weamer, J. L. w/a	WTP	MS5-K
DOE Correspondence Control w/a	ORP	H6-60
PADC w/a	WTP	MS19-A

Response to Finding S-11-WED-RPPWTP-042-F01

Identified Finding

Contract No. DE-AC27-01RVI4136, Section C, Standard 9, Radiological, Nuclear, and Process Safety, paragraph 2 states: "The contractor's integrated standards-based safety management program shall be developed to comply with the specific nuclear safety regulations defined in the effective rules of the 10 CFR 800 series of nuclear safety.

10 CFR 830, Subpart B, paragraph 202(c) (1) requires contractors to update the safety basis to keep it current and to reflect changes in the facility.

Contract No. DE-AC27-01RVI4136, Section C, Standard 9, Table S9-1, Radiological, Nuclear, and Process Safety Deliverables, requires the contractor to maintain the [Preliminary Documented Safety Analysis] PDSA current to within 60 days of design.

Contract No. DE-AC27-01RV14136, Section C, Standard 7(e) (3), required BNI to develop a [Quality Assurance] QA Program documented in a QA Manual.

BNI's Quality Assurance Manual, 24590-WTP-QAM-QA-06-001, Revision 9, Policy Q-05.1, Instructions, Procedures, and Drawings, Section 5.1.2.1, required work to be performed in accordance with instructions, procedures, or drawings that include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed results have been satisfactorily attained.

Contrary to the above, BNI's Authorization Basis program and Design Verification programs are not adequate to ensure Authorization Basis requirements are adequately aligned (in a timely manner before material installations), with applicable facility design after the design has been issued for procurement/issued for construction (IFP/IFC). Specifically, BNI installed PTF [Process Vessel Vent Process] PVP piping in Planning Area 7 in late July 2011 when the design of this piping was not in accordance with the Preliminary Documented Safety Analysis (PDSA). BNI had identified this condition in May of 2011. Furthermore, as of September 30, 2011, BNI continued to install PVP piping that was not in compliance with the approved safety basis. (Finding S-II-WED-RPPWTP-F01)

1) Cause(s) of the Finding

The WTP Quality Assurance Manual, Section 3.1.2.8.4 requires design verification (DV) be performed prior to releasing the design for procurement, manufacture, or construction, except when this timing cannot be met, such as when insufficient data exists. In the PVV/PVP piping case, the design was verified and issued with procurement and construction activities under way when the changes in the safety basis requirements were put in place. The WTP Design Verification procedure (24590-WTP-3DP-G04B-00027, *Design Verification*) requires a determination for design re-verification when safety basis changes are made. The PVV and PVP systems were designated for re-verification (24590-WTP-DVM-M-03-001, *Mechanical Systems and HVAC Engineering Design Verification Scope and Approach Overview Matrix* Rev. 17). However, the PVV/PVP design changes necessary to implement the relevant safety basis changes were not sufficiently developed to perform design re-verification. The WTP Quality Assurance Manual also states that design verification must be completed prior to installation being irreversible. BNI does not consider the installation of the PVV/PVP piping system to be irreversible at this time. In addition, safety basis-compliant alternatives have been identified that would not affect the PVV/PVP piping system.

BNI design processes ensure/verify compliance with safety basis requirements at the time the design is issued, to include revisions to issued design. Those processes are described in 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, and the interfacing Engineering Department Procedure Instructions (EDPIs). When changes

are made to the safety basis, those changes are not flowed down into the design instantaneously. Therefore, there will be a lag time between the revised safety basis and the necessary design changes. The PVV/PVP lag time appears to be excessive, although there was a slow but steady increase in requirements for the PVV system.

For this case and others, the impact assessment and subsequent project business decisions related to ongoing Engineering, Procurement, and Construction (EPC) activities that result from modified safety basis requirements have been informal. In this specific case, design alternatives that would incorporate the revised safety basis requirements were identified. However, the impacts to the facility structure, layout, cost, and schedule associated with those alternatives were profound given the stage of the project. Consequently, there was an informal WTP/DOE project decision to pursue an achievable, viable alternative design that met the overall facility safety objectives. This alternative solution (controls to prevent multiple Pulse Jet Mixer (PJM) overflow events) avoids the significant impacts to the PTF facility including impacts to PVP piping. However, this solution is not currently incorporated in the issued safety basis and will require a revision to the safety basis to implement. The discussion in the ORP surveillance S-11-WED-RPPWTP-042 illustrates this timeline.

The cause of the finding is that current informal processes used to document Project impacts and decisions related to safety basis changes that affect existing design/installation are no longer adequate given the advanced state of Engineering, Procurement, and Construction and the potential for installations to become irreversible, or only reversible at unacceptable project expense.

2) The corrective actions that have been taken to control or remove any adverse impact from the non-compliant conditions (remedial actions) and the results achieved.

1. BNI has evaluated project processes that control the turnover of systems and equipment to ensure that processes are adequate to prevent the potential inadvertent use of systems affected by the extent of condition.

Project Issues Evaluation Report (PIER) 24590-WTP-PIER-MGT-07-0450-D, *System and Component Turnover from Construction to C&T*, was self-identified when BNI recognized a process gap relative to equipment turnover. The Issue Description for that PIER is provided below:

“An apparent process gap exists between Construction and Engineering procedures relative to system and component turnover from Construction to C&T. For example, neither 24590-WTP-GPP-CON-1602, *System and Area Completion and Turnover*, nor any of the EDPs address confirmation that design requirements have been satisfied, design verification is complete (as appropriate), design documentation is complete and test and acceptance requirements have been defined (as appropriate) prior to initiation of a turnover process. This gap affects turnover from Construction to C&T for startup and operation of systems/components by Construction during construction.”

A cross-functional team was formed to investigate and resolve the PIER-MGT-07-0450-D issue. The team identified a wide range of activities to strengthen Engineering, Construction, Operations and Startup procedures. Central to the resolution was the generation of new procedure, 24590-WTP-3DP-G04T-00916, *Design Completion For Turnover To Startup Or Plant Operations*, in September 2007. This procedure provides a process for documenting the determination that designs are sufficiently complete for turnover to Startup or Plant Operations, and provides for the tracking of incomplete items. Sections 3.1.1, System Turnover, and 3.1.2, Area Turnover, both require confirmation that safety-related design is complete. The turnover criteria within the procedure, in Exhibit A, and the turnover checklist within the procedure, in Exhibit B, both require that Design Verification is complete prior to turnover. As described in Section 3.2 of the procedure, Environmental and Nuclear Safety reviews and signs the Design Completion List (DCL) to confirm that the safety analyses, safety basis, and permits are in accordance with the design completion criteria provided in Exhibit B, Design Completion Criteria for Turnover.

Procedure 24590-WTP-3DP-G04B-00027, *Design Verification*, describes the process for confirming that safety basis requirements have been satisfied in the design and requires that incomplete verification be documented on the Design Verification Matrix and tracked to completion. The procedure also requires re-verification of design subsequent to changes in the safety basis. (In Section 1 above, the "Cause(s) of the Finding" discussion notes that for the PVV/PVP piping both of these requirements were being met.) 24590-WTP-3DP-G04T-00916, *Design Completion For Turnover To Startup Or Plant Operations*, Exhibit B, Design Completion Criteria for Turnover requires confirmation that design verification has been completed prior to system or area turnover.

These proceduralized control mechanisms prevent equipment that is not aligned with the safety basis from being used. BNI has confirmed that the PIER-07-0450-D turnover process controls remain in place.

2. As a compensatory action in advance of work process changes to address inadequate alignment between the safety basis and issued design that affects received equipment, equipment in procurement or competed/in-progress installation, a review was completed by a joint team of BNI/DOE staff of each of the items on the Safety Systems Reconciliation (SSR) list. Highlights of that review are as follows:
 - Each of the 18 items on the SSR list was discussed. Several items, as documented in the meeting minutes (CCN 226536), were removed from the list through discussion. (The basis for removal was that the item did not represent a mis-alignment between the safety basis and design.)
 - BNI utilized the Management Suspension of Work (MSOW) process described in Project procedure 24590-WTP-GPP-MGT-008, *Work Pause/Management Suspension of Work/Stop Work*, to control safety system misalignments and document the project response. The MSOW process documents: what is on hold, what it takes to remove items from hold status, an explanation of Denied Conditions (Release from MSOW process), and partial release criteria for individual tasks that are part of an MSOW.
 - Draft MSOWs were reviewed and attendees discussed which of the remaining SSR items need to be placed on hold. The hold scope, and what activities need to be completed in order to remove items from hold status were also discussed.
 - A work process flow chart illustrating the future work process to be proceduralized and implemented was also reviewed. A copy of the flow chart (with subsequent comments incorporated) is attached to this response as Attachment 5.

The table provided in Section 3 of this response, below, documents the MSOWs that have been issued to control work associated with the remaining SSR list.

Of particular relevance to Finding F01, MSOW 24590-WTP-MSOW-11-0003, for the PVV/PVP System places holds on:

1. installation of the PVP High Efficiency Mist Eliminator (HEME) and scrubber,
 2. installation of PVV/PVP header pipe and pipe modules,
 3. installation of stick-built PVP header piping, and
 4. the award of other PVV/PVP equipment as detailed in the MSOW.
3. This Finding identifies a concern for changes in the safety basis that impact previously aligned and issued design. BNI is confident that the work processes to be developed as a result of this response will be effective in identifying and controlling safety basis misalignments.

In the interim, BNI will immediately implement the process illustrated in Attachment 5 to this response through management direction to do so.

4. BNI will develop and issue a schedule for the Hazard and Operability (HAZOP) evaluation for the PVV/PVP piping prior to installation of the next piping module. The associated details are provided in the response to Observation 3 (Attachment 4 to this response).

3) The corrective action(s) that will be taken to identify the extent of condition, correct the cause(s), and prevent further Findings.

The initial extent of condition for this Finding is the ten items remaining on the SSR list following the determinations made during the meeting described paragraph 2(2, above. As described in Action 3 of the Commitment table below, the SSR will be a living list and is subject to change.

Extent of Condition Table

Safety System Reconciliation Item		PIER (24590-WTP- PIER-MGT-)	Responsible PEM	MSOW (24590-WTP- MSOW-MGT-)
Number	Title			
1	PVP & PVV Systems	10-0343 10-0364 10-0365	M. Johnson	11-0003
2	Safety Systems required for Post-flooding	09-1382	T. Hughes, M. Braccia, M. Johnson	11-0004
3	Single failure criteria	10-0818	W. Underhill	11-0005
4	UFP Safety Interlocks	09-1288	M. Johnson W. Underhill	11-0006
5	Safety System required for Post-fire	10-0999	T. Hughes, M. Braccia, M. Johnson	11-0007
6	Safety Systems required for ashfall	11-0656	T. Hughes, M. Braccia, M. Johnson	11-0008
7	PJM Controls	11-0588	R. Daniel	11-0009
8	HLW HFP misalignment with AB	11-0830	M. Braccia	11-0010
9	PT C5V Filter Performance	11-0660	Mark Johnson	11-0011
10	HLW C5V Filter Performance	11-0648	M. Braccia	11-0013

Actions to correct the cause and prevent further Findings are provided in the commitment table below.

WTP Commitment Table

BNI Action (24590-WTP-PIER-MGT-11-0979-B)	Evidence of Completion
<p>1. Revise the process used to validate requirements prior to their approval in design criteria documents. The resulting process will require conducting an analysis to understand the impacts of change and identifying affected design documents prior to approving criteria changes.</p> <p>This improvement will add documentation for management decisions to accept or reject the change. This action is also responsive to Observation 01; Attachment 2 to this response.</p>	<p>New and/or revised procedures/guides.</p>
<p>2. Revise project procedures to describe a revised Project process for responding to misalignment with safety basis requirements with the potential to affect the design of procured or installed SSCs.</p> <p>This process will incorporate the features illustrated in Attachment 5 of this response and is also responsive to Observation 02; Attachment 3 to this response.</p>	<p>New and/or revised procedures/guides.</p>
<p>3. Revise 24590-WTP-GPP-SREG-002, <i>Authorization Basis Maintenance</i> and interfacing Engineering procedures to re-focus the Justification for Continued Design Procurement and Installation (JCDPI) process on commercial risk as distinct from nuclear safety risk. The revision(s) will include the following:</p> <ul style="list-style-type: none"> • Question 7 of the JCDPI form will refer to a separate safety evaluation prepared in accordance with a process that will transition into an Unreviewed Safety Question (USQ) process at a later date. This safety analysis will accompany JCDPIs submitted for approval. • Institutionalize a process to maintain the Safety Systems Reconciliation list current. <p>This action is also responsive to Observation 02; Attachment 3 to this response.</p>	<p>New and/or revised procedures/guides.</p>

4) Date when all Corrective Actions will be completed, verified, and compliance to applicable requirements achieved.

April 30, 2012

Response to Observation S-11-WED-RPPWTP-042-O01

Identified Observation

Observation **S-II-WED-RPPWTP-042-O01**: Where safety basis requirements change after the associated design is [Issued for Procurement/Issued for Construction] (IFP/IFC), especially when broad changes such as is the case for the PVP system are pending (but before they happen), a robust discussion between BNI Environmental and Nuclear Safety and the responsible [Integrated Project Team] (IPT) would reduce risk to the project and ensure requirements changes were fully evaluated up front. The discussion would include a clear definition of the change in terms of functional requirements expected of the system, and the impact of the proposed change on the issued design, procurement, and construction.

1) Actions that have been taken to address the Observation

BNI has reviewed the sequence of events related to PVP/PVV design and identified the need for process enhancements to more clearly define requirements for addressing ongoing procurements/installation when disconnects are identified between issued design and safety basis requirements (e.g. when - PDSA changes are made), and a lengthy period of time is required to bring the design into alignment with the safety basis requirements.

2) Actions that will be taken to address the Observation

The actions taken in the response to S-11-WED-RPPWTP-042-F01 address this Observation.

WTP Commitment Table

BNI Action	
24590-WTP-PIER-MGT-11-0980-D	Evidence of Completion
See S-11-WED-RPPWTP-042-F01 actions in Attachment 1.	See S-11-WED-RPPWTP-042-F01 actions in Attachment 1.

3) Date when all actions will be completed and verified.

April 30, 2012

Response to Observation S-11-WED-RPPWTP-042-O02

Identified Observation

Observation S-11-WED-RPPWTP-042-O02: Where Authorization Basis requirements change after the associated design is IFP/IFC, and impacts are identified to issued design elements, in order to prevent irreversible installations as required by the WTP QAM, there should be a process for clearly tracking and identifying affected elements.

1) Actions that have been taken to address the Observation

BNI has reviewed the sequence of events related to PVP/PVV design and identified the need for process enhancements to more clearly define requirements for addressing ongoing procurements/installation when disconnects are identified between issued design and safety basis requirements (e.g. when - PDSA changes are made), and a lengthy period of time is required to bring the design into alignment with the safety basis requirements.

2) Actions that will be taken to address the Observation

The actions taken in the response to S-11-WED-RPPWTP-F01 address this observation. See WTP Commitment Table in Attachment 1.

WTP Commitment Table

BNI Action	
24590-WTP-PIER-MGT-11-0981-D	Evidence of Completion
See S-11-WED-RPPWTP-042-F01 actions in Attachment 1.	See S-11-WED-RPPWTP-042-F01 actions in Attachment 1.

3) Date when all actions will be completed and verified.

April 30, 2012

Response to Observation S-11-WED-RPPWTP-042-O03

Identified Observation

Observation S-11-WED-RPPWTP-042-O03: Hazards Analysis Meeting, aka HAZOP, to determine if controls proposed by Engineering in CCN: 234424 are feasible, could reduce the significant risk associated with the future installation of PTF piping modules.

1) Actions that have been taken to address the Observation

None.

2) Actions that will be taken to address the Observation

BNI has developed a plan to aid in resolution of the condition noted in Observation 3 of S-11-WED-RPPWTP-042-O03. Specifically, the plan is to define a three-step sequential process; (1) hazards analysis, (2) accident analysis, and (3) controls selection, that can define the PVP/PVV piping safety requirements, identify and evaluate upsets that might jeopardize those requirements, and identify controls or changes necessary to ensure those requirements are met.

The process will account for the hazards noted in CCN 234424, the PDSA, and the PDSA Addendum, and will also consider the design strategy documented in CCN 234433. The plan is to ensure that controls identified to address multiple overblows, in relation to PVP/PVV piping, are feasible in preventing and/or mitigating the event and thereby reducing the significant risk associated with the future installation of PTF piping modules.

Technical Scope and Process

The planned effort starts with a hazards analysis using the HAZOP technique. A multi-discipline team will evaluate the PVP/PVV piping for upsets that might challenge the PVP/PVV system safety functions.

The first step in the process is for the HAZOP team, led by the nuclear safety analyst, to define the PVP/PVV piping safety functions and functional requirements, by examining the overall system functions. This effort will build on the hazards identified in CCN 234424, the PDSA, and the PDSA Addendum. Once the safety requirements are defined, each subsequently identified upset will be examined for the possibility that one or more of those requirements will not be met.

The HAZOP team then postulates deviations from design intent using guideword and deviation combinations, which will identify upset conditions. Each upset condition will be tested against the safety requirements identified in the first step to determine if one or more safety functions could be lost. If no functions are impacted by the deviation, it is documented. If safety functions could be lost, then possible causes and initiating events are explored along with potential controls or design changes that could be implemented to ensure that the safety functions are maintained.

The second step in the process is to initiate updates to the accident analysis associated with the outcome of the hazards analysis. The accident analysis updates

would be conducted following hazards analysis and work iteratively with the HAZOP team. The accident analyst will be part of the HAZOP team.

The third step is to conduct the controls selection based on the outcome of the HAZOP and the updated accident analysis. The controls selection will be documented.

The fourth and final step is to prepare and obtain approval of the changes to the PDSA corresponding to the results of the Hazards Analysis Report (HAR) and updated accident analysis. Current planning assumes that this document is an Authorization Basis Amendment Request (ABAR).

The hazards and accident analysis will be performed using drawings and other bases documents. This hazards analysis will not analyze for interactions with other systems. After the system-based hazard analyses are complete, the process will be repeated on a facility basis building upon the system-based effort.

Documentation

The results of the HAZOP and controls selection will be documented in a HAR. The HAR will also be integrated with the updated accident analysis.

The results of the HAR and updated accident analysis will be reflected in a change to the PDSA and Addendum (as necessary). It is expected that the change will require an ABAR.

WTP Commitment Table

BNI Action	Evidence of Completion
24590-WTP-PIER-MGT-11-0982-D	
Complete Hazards review of PVP/PVV system.	Issued HAR report.
Select Controls.	HAR report revision.
Issue ABAR to review (if required).	Letter documenting request for ABAR approval.

3) Date when all actions will be completed and verified.

April 15, 2012

Work Process Flow Chart

